Guadalupe Bayou Flow and Inundation Study

Final report to the BBASC

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Work accomplished

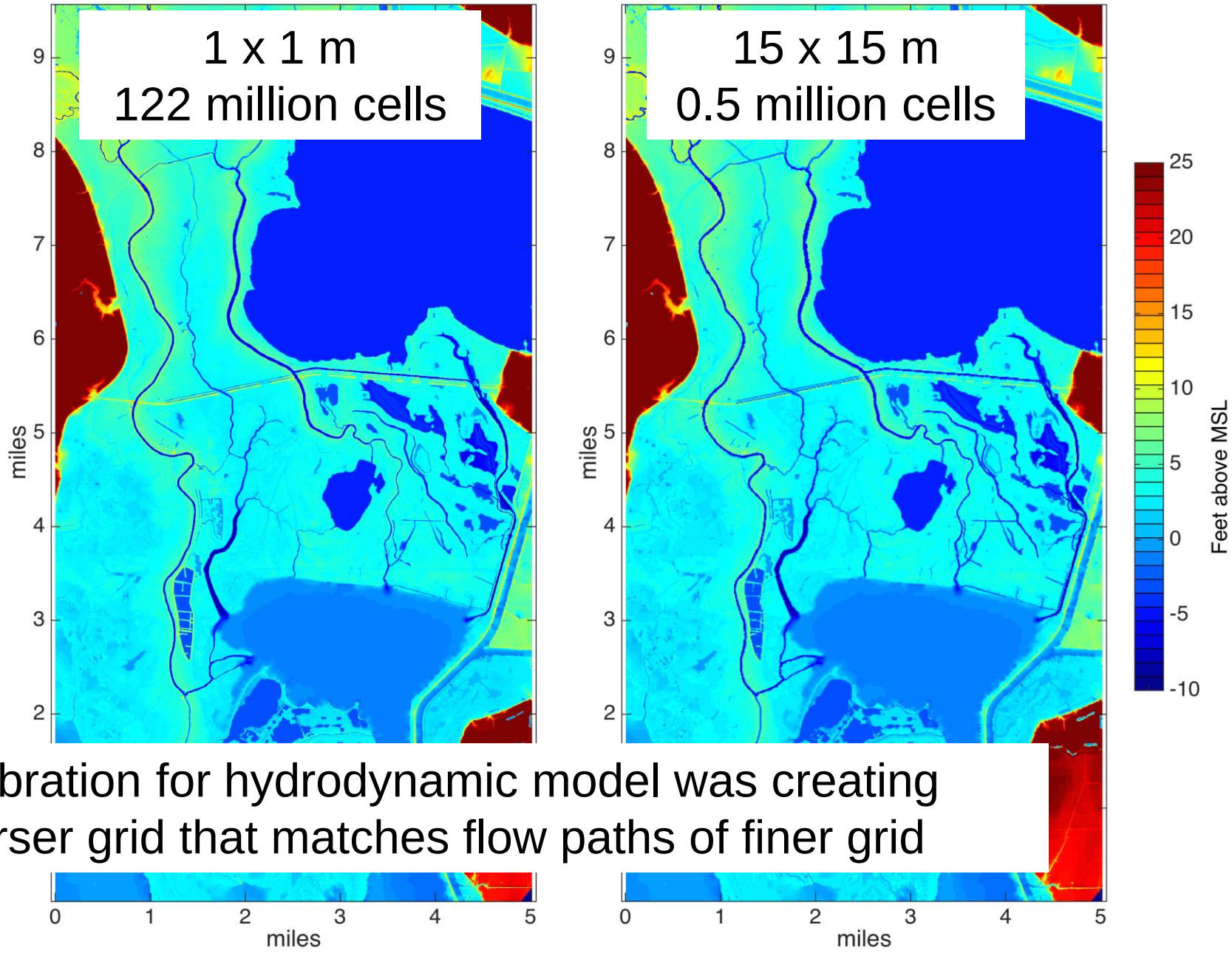
- Digital elevation model based on lidar data and detailed analyses.
- Inundation analysis using GIS tools.
- Field data collection for water levels, temperatures, and salinity.
- First stage of hydrodynamic modeling for connectivity in bayou.

Inundation Maps

Can be used to determine areas below any selected water height
1 and 2 ft above sea level shown.

Requires further analyses to evaluate connectivity between areas or to quantify areas at different water levels.

Digital Elevation Model



Calibration for hydrodynamic model was creating coarser grid that matches flow paths of finer grid

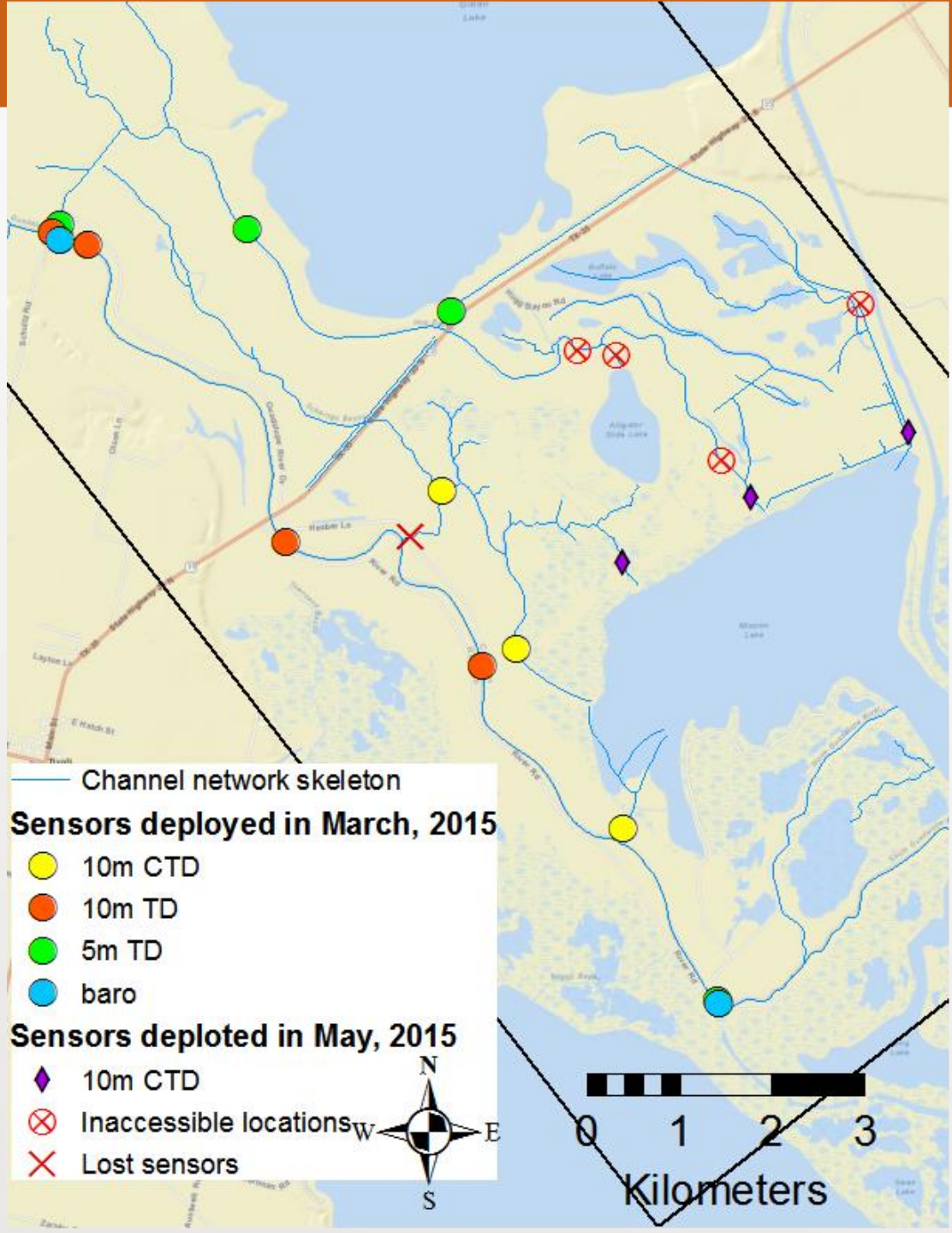
Sensor names

Field Sensors Deployed

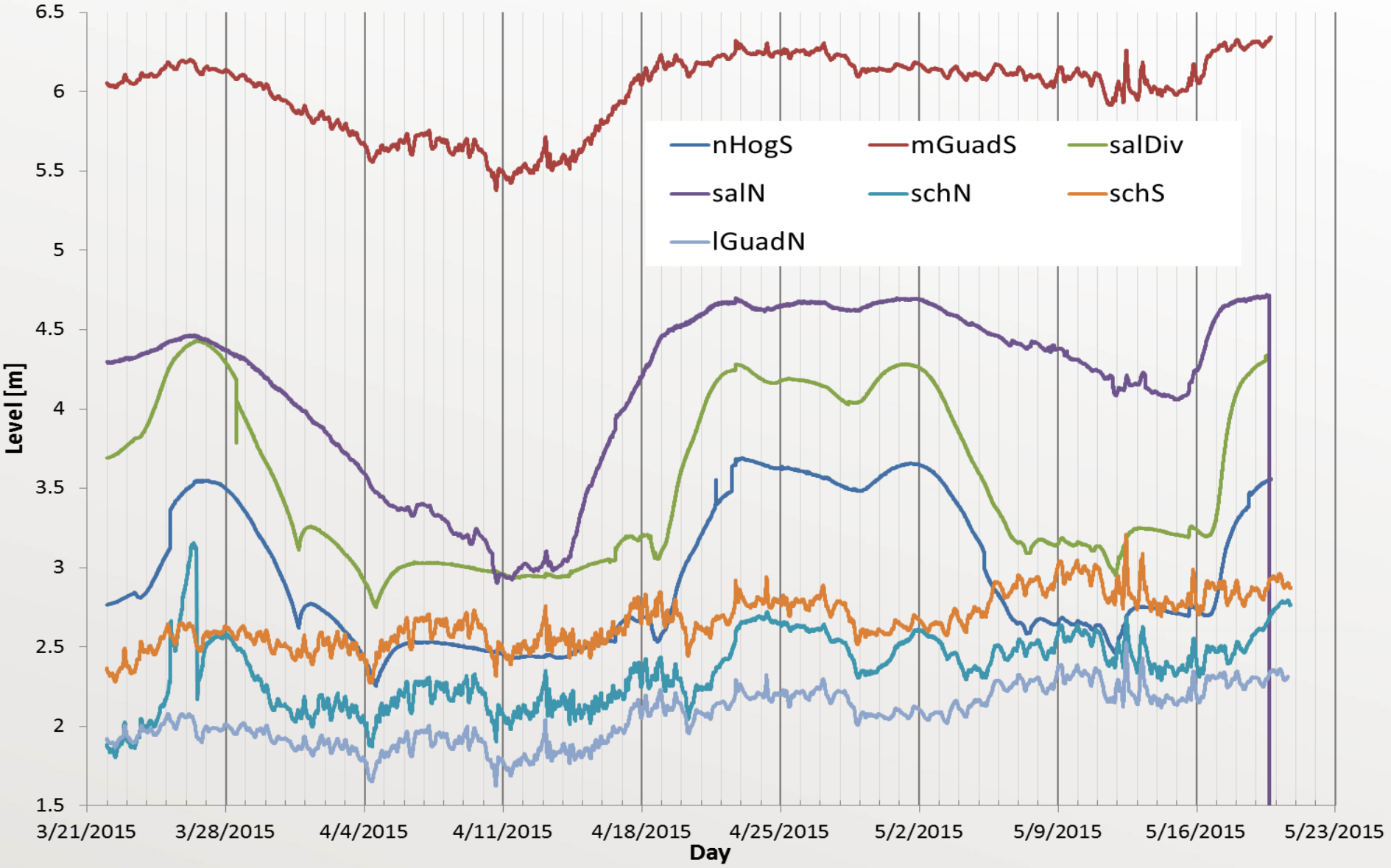
Deployments
- March 18-20, 2015
- May 20-22, 2015

Data recovery
- May 20-22, 2015
- Aug 19-20, 2015

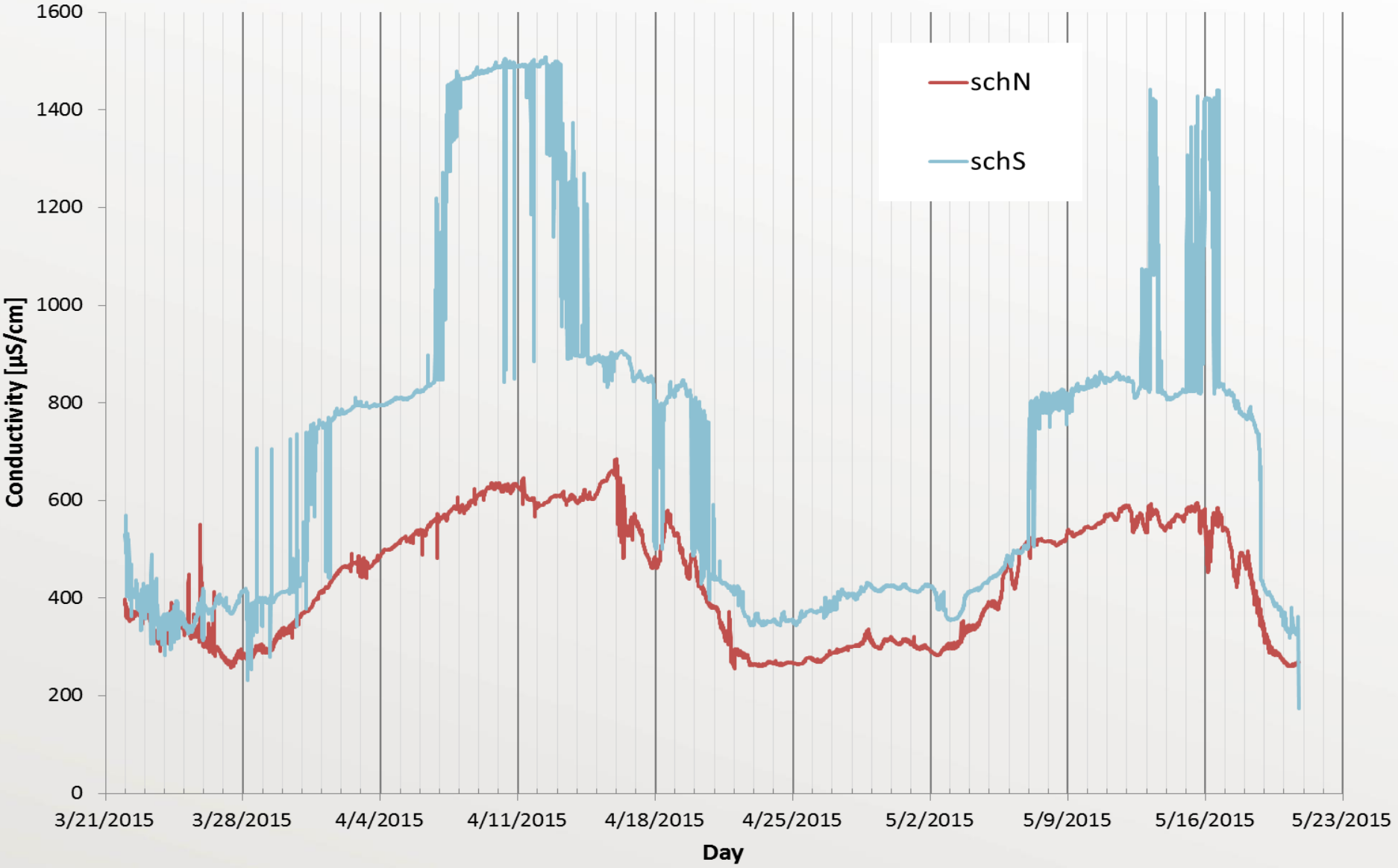
Instrument recovery
- Aug 19-20, 2015



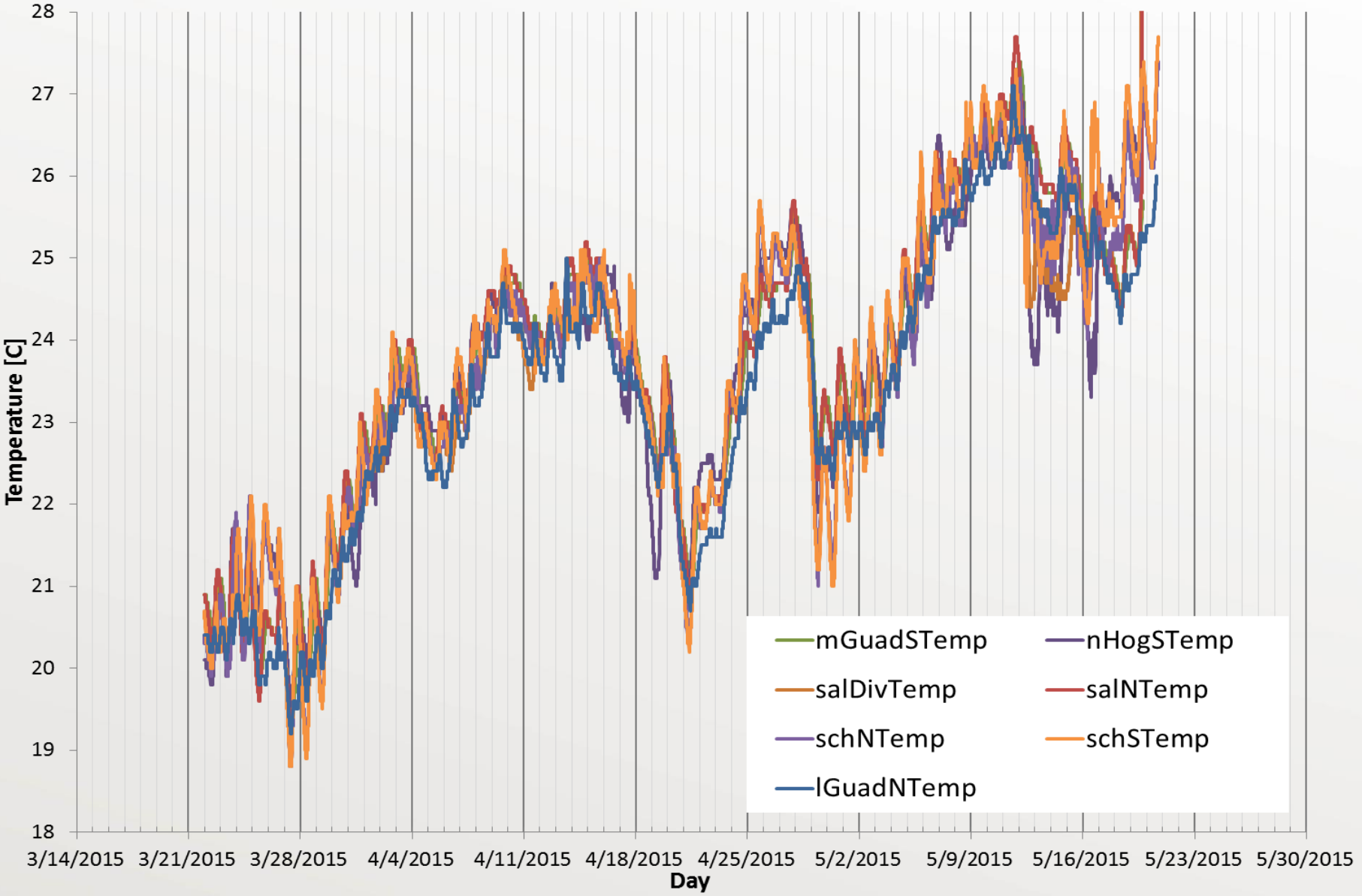
Raw data – Water Level



Raw data – Conductivity



Raw data – Temperature



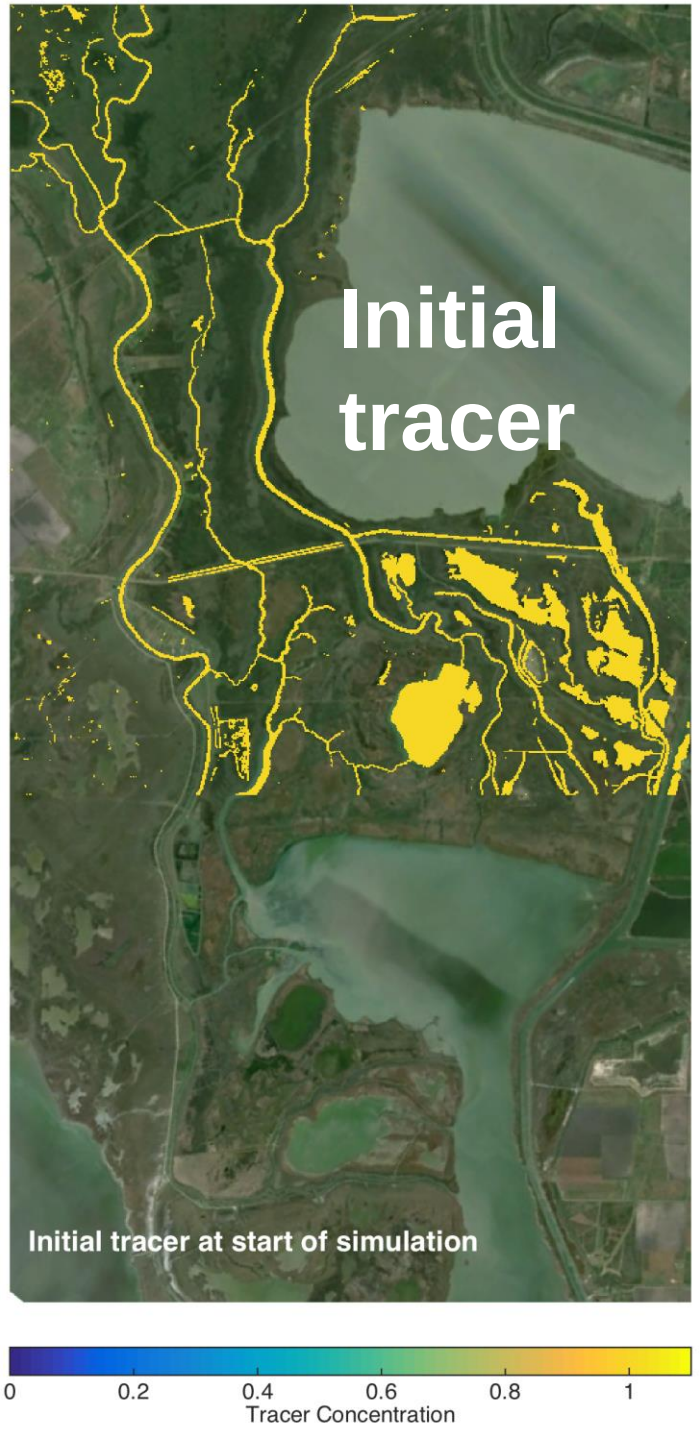
Hydrodynamic model results

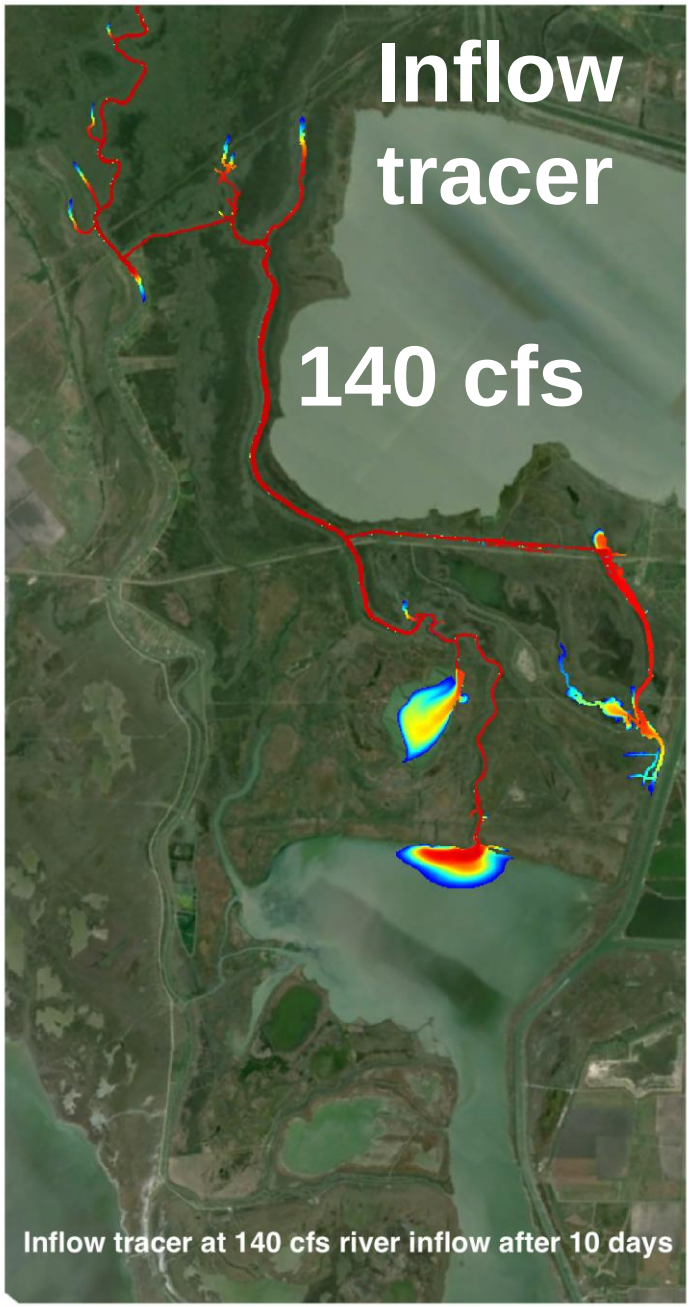
Tracers to illustrate connectivity.

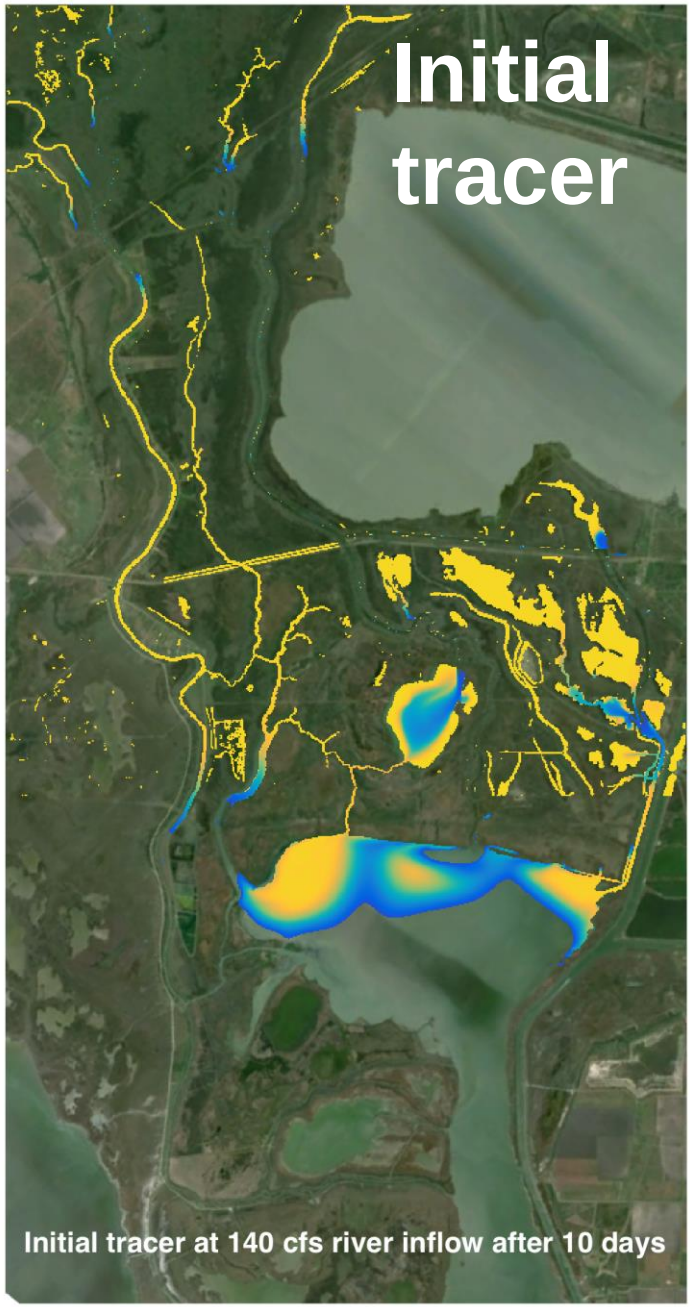
Initial tracers shown at right.

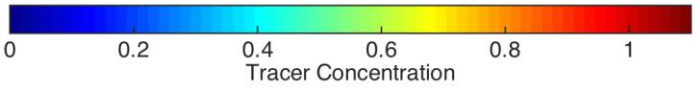
Flow rates tested:

- 140 cfs
- 280 cfs
- 560 cfs
- 1120 cfs
- 1680 cfs
- 2800 cfs




Inflow tracer
140 cfs
Inflow tracer at 140 cfs river inflow after 10 days


Initial tracer
Initial tracer at 140 cfs river inflow after 10 days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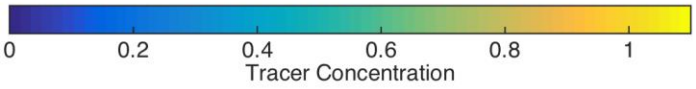
Tracer Concentration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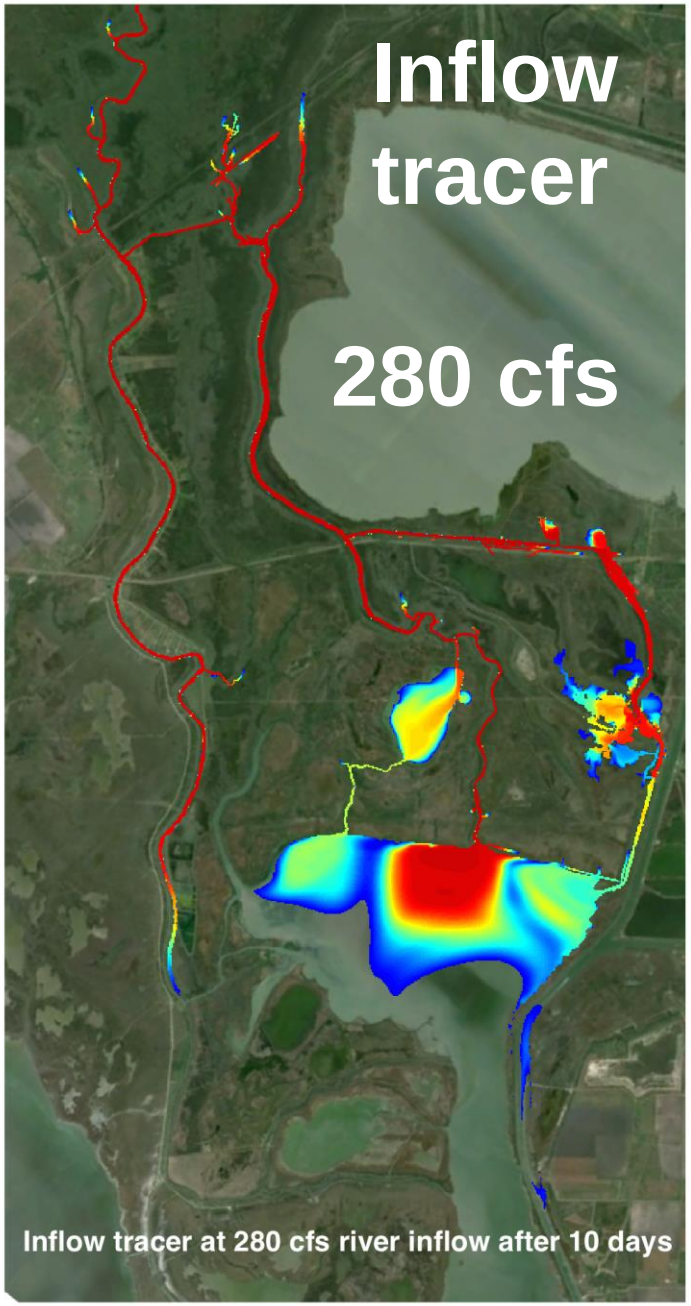
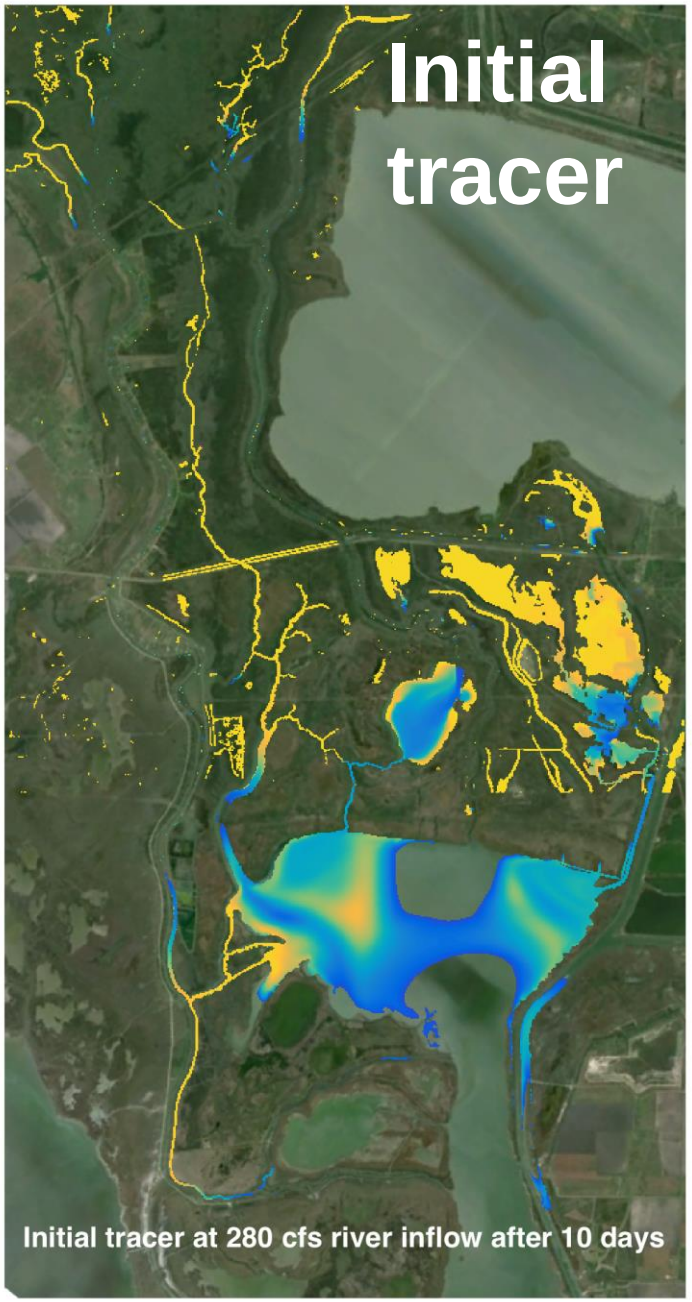
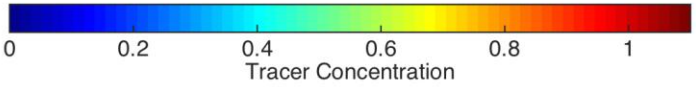
Tracer Concentration


Inflow tracer
280 cfs
Inflow tracer at 280 cfs river inflow after 10 days


Initial tracer
Initial tracer at 280 cfs river inflow after 10 days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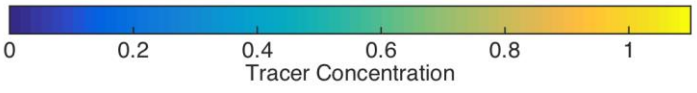
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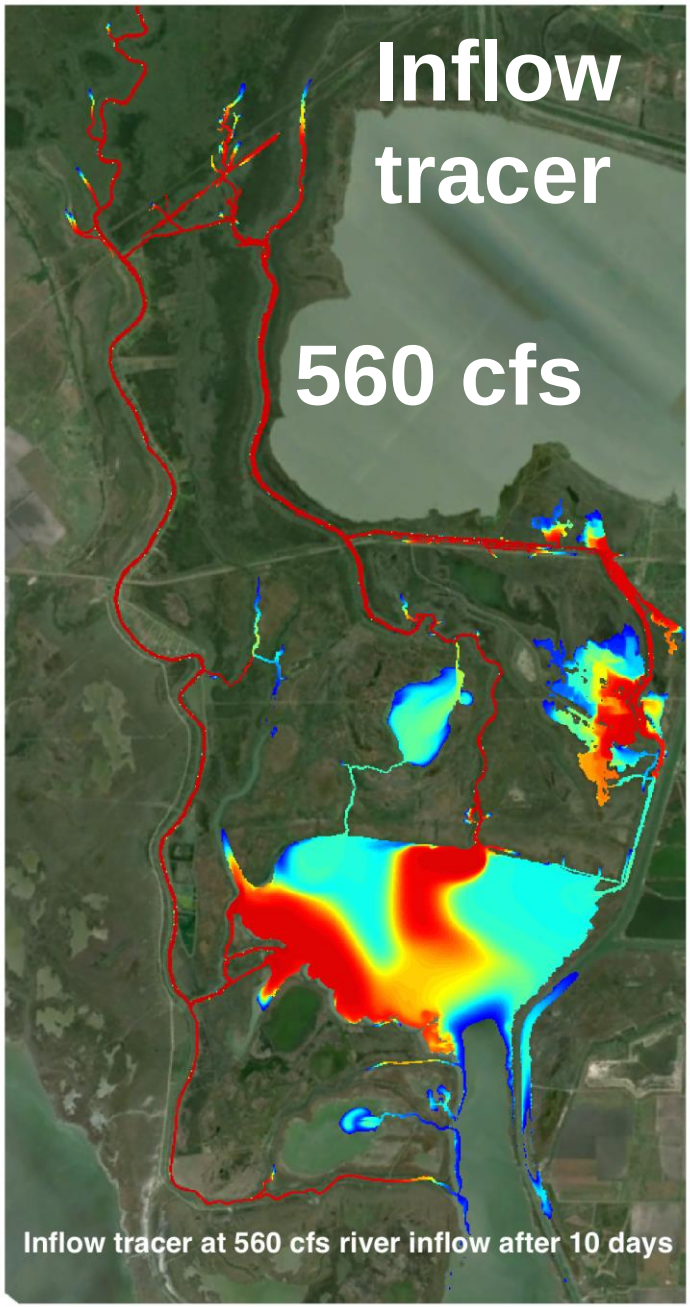
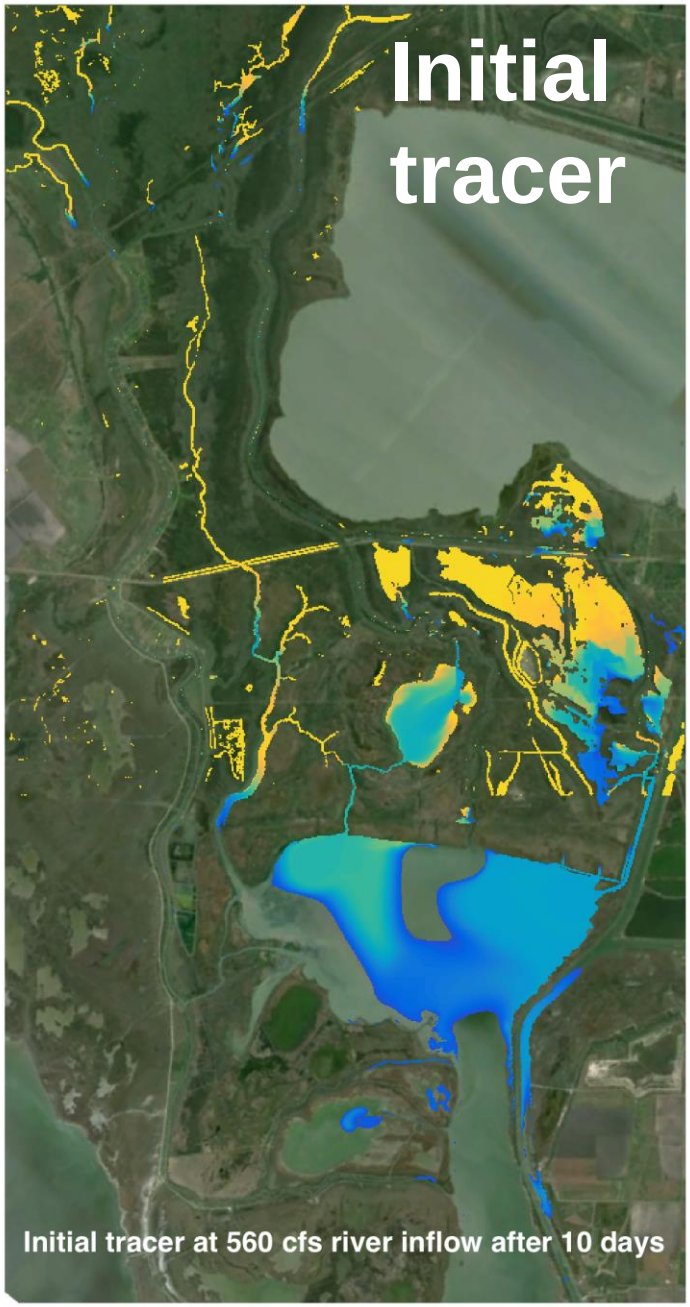
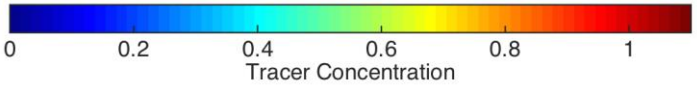
Tracer Concentration


Inflow tracer
560 cfs
Inflow tracer at 560 cfs river inflow after 10 days


Initial tracer
Initial tracer at 560 cfs river inflow after 10 days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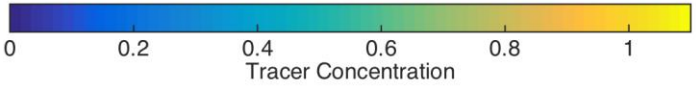
Tracer Concentration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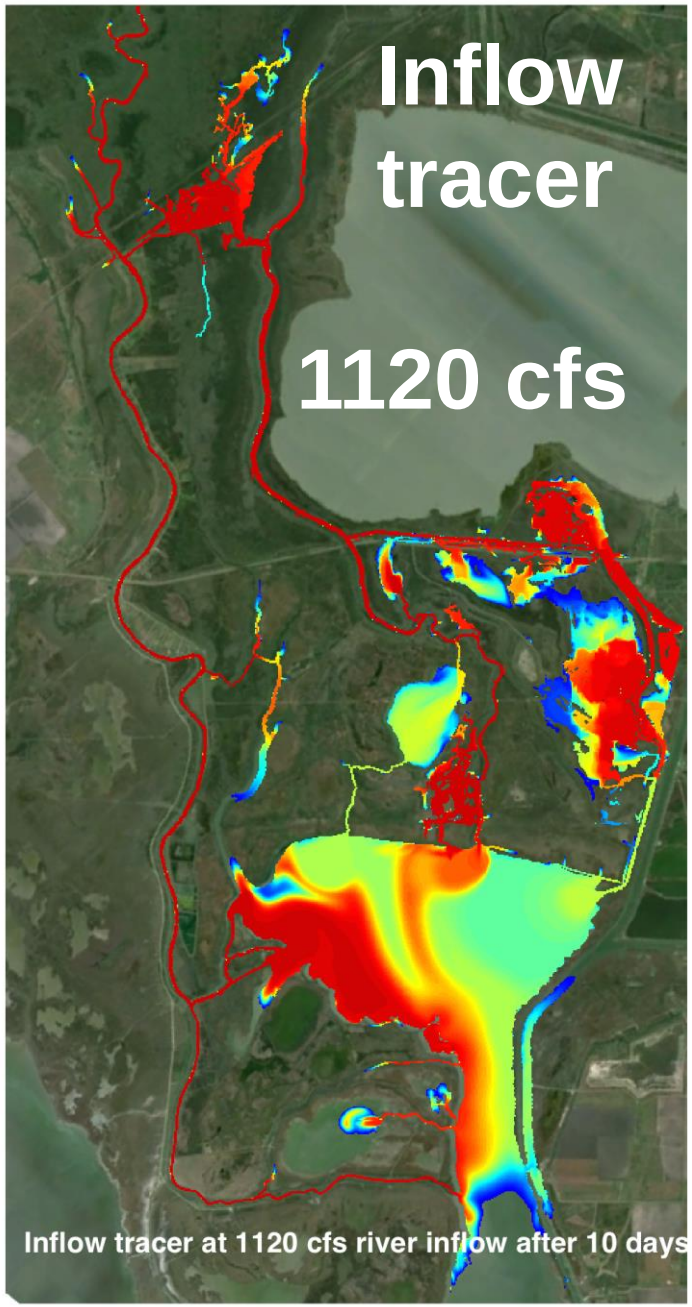
Tracer Concentration


Inflow tracer
1120 cfs
Inflow tracer at 1120 cfs river inflow after 10 days
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0.2
0.4
0.6
0.8
1
Tracer Concentration


Initial tracer
Initial tracer at 1120 cfs river inflow after 10 days
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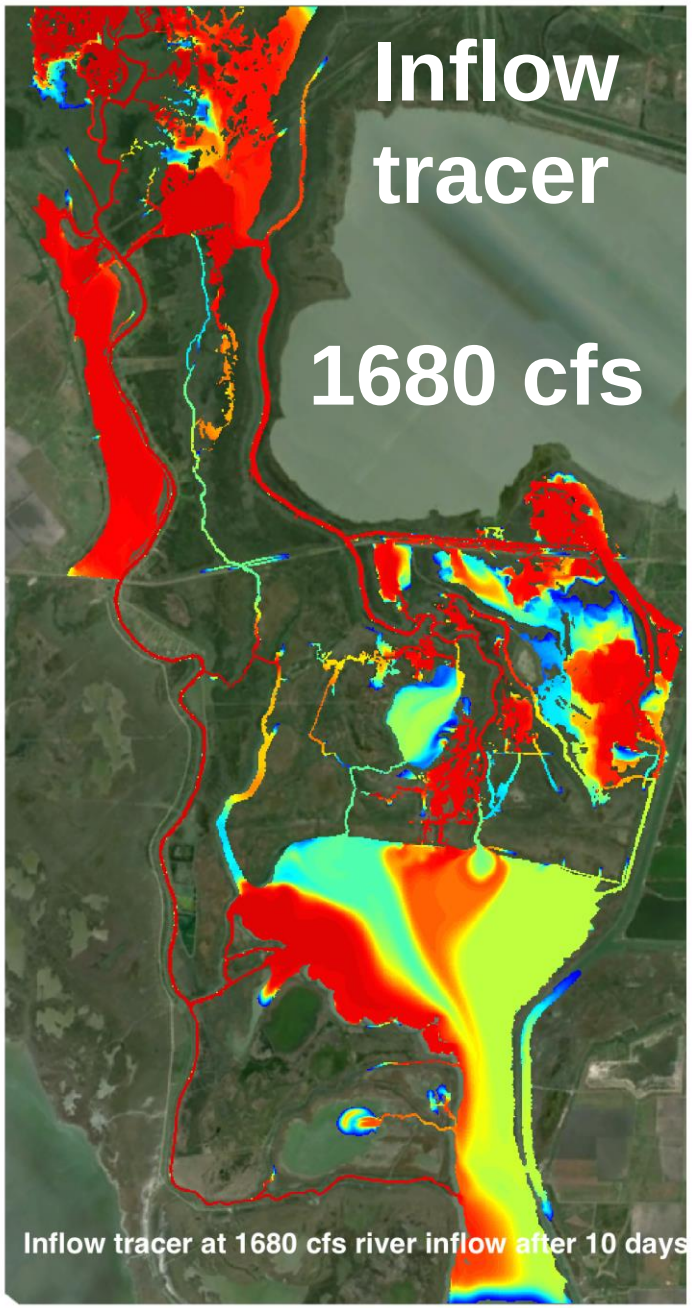
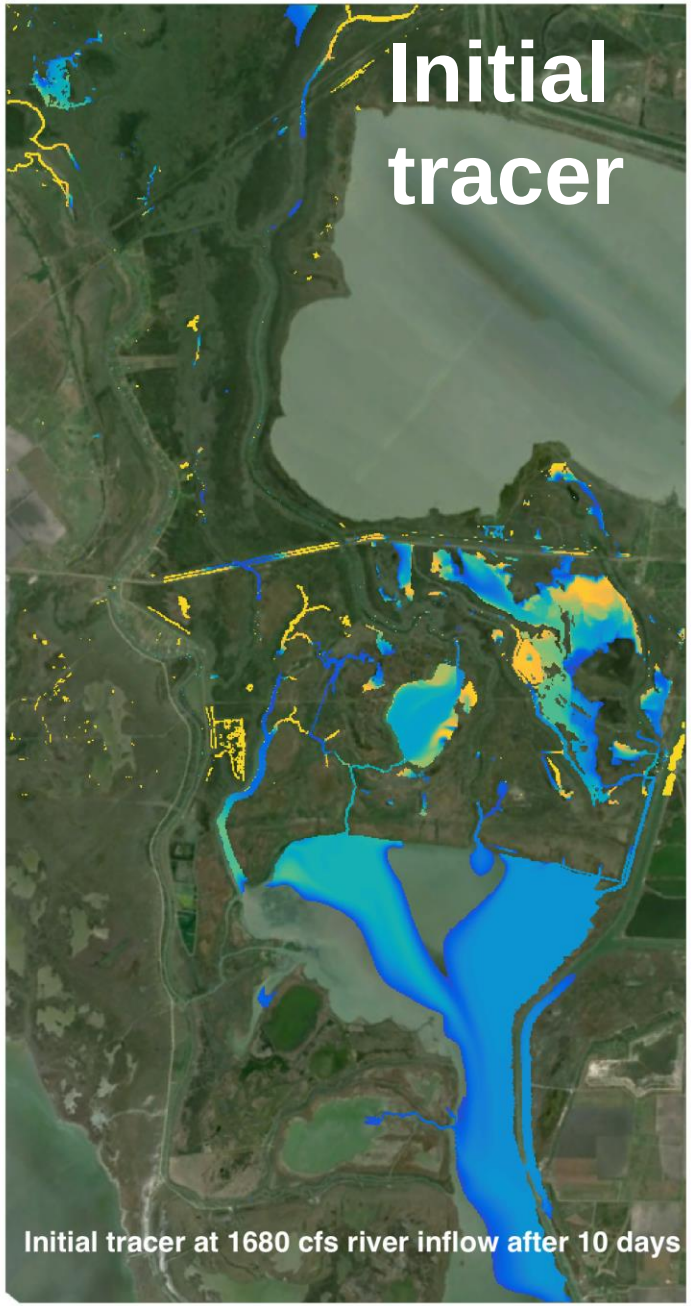
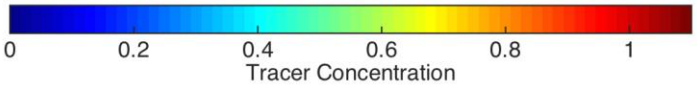
0.8
1
Tracer Concentration


Inflow tracer
1680 cfs
Inflow tracer at 1680 cfs river inflow after 10 days


Initial tracer
Initial tracer at 1680 cfs river inflow after 10 days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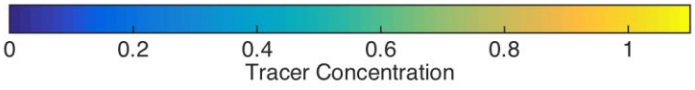
Tracer Concentration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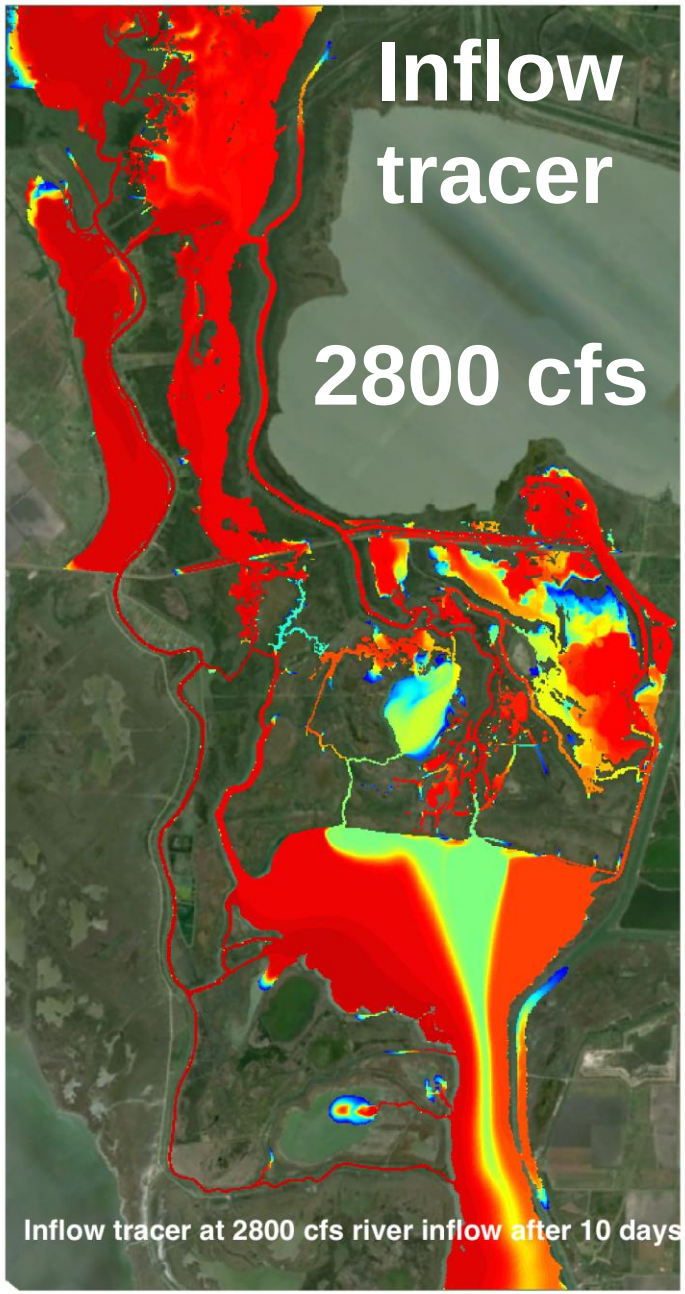
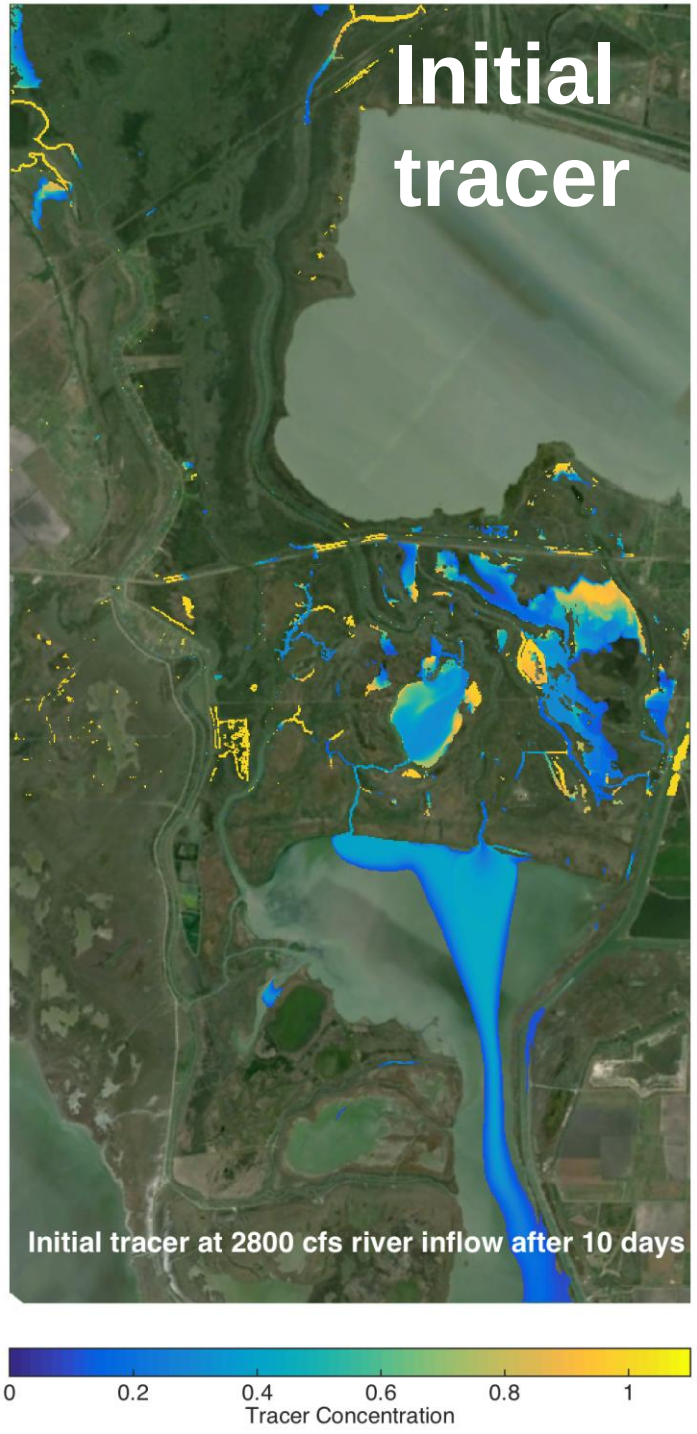
Tracer Concentration


Inflow tracer
2800 cfs
Inflow tracer at 2800 cfs river inflow after 10 days
0
0.2
0.4
0.6
0.8
1
Tracer Concentration


Initial tracer
Initial tracer at 2800 cfs river inflow after 10 days
0
0.2
0.4
0.6
0.8
1
Tracer Concentration

Limits of hydrodynamic model

Hydraulic representation of gates is not presently included – requires more data on sizes of openings and their installation.

Channels narrower than 15 m are widened, which affects the modeled flow rates.

Full calibration/validation not done (not part of contract).

Model does not include areas outside of lidar data, which includes substantial catchment flows.

Model is useful for *qualitatively* understanding connectivity – not for *quantitatively* predicting response.

Recommendations for future work

- Analyses of field data.
- Development of inundation maps at water surface elevations of interest to the BBASC.
- Addition of gate flow behavior to the hydrodynamic model.

Concluding points

- Major thrusts of projects accomplished.
- Field data not as extensive as originally planned due to logistics and weather (some funds returned to state).
- Hydrodynamic model is workable, but is close to the limits that can be accomplished without going to a supercomputer.

Acknowledgements

Funding provide by BBASC recommendations to TWDB.

We would like to thank numerous personnel within TWDB, GBRA.

Particular help with setting of the field work has been provided by:
Kevin Kriegel, TPWD
Dan Alonso, SABAY

salDiv = at diversion canal
salN = above diversion canal
salBar = at barrier
salS = below barrier
nHogS = upper Hog Bayou
35div = diversion canal at hwy 35
mGuadN = N on main stem
mGuadS = S on main stem
lGuadN = lower Guadalupe
schN = N sensor on Schwings Bayou
schS = S sensor on Schwings Bayou
mamS = Mamie Bayou entrance
hogS = Hog Bayou entrance
goffS = Goff Bayou entrance
tc = planned, but not emplaced